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G. E. INSKEEP

FILE

To: Dr. G. E. Inskeep

Date: February 12, 1976

From: N. B. Rainer

Subject: PM #625 - Process for Incorporating Flavorant into Cellulosic Substrates and Products Produced Thereby

The following comments are submitted in response to Mr. French's letter of October 29, 1975, in the above identified case:

The preferred compounds are those which are normally liquid at room temperature and have a vapor pressure between 1 and 10mm at a temperature of 60°C. Compounds having a vapor pressure lower than 1mm generally do not release quickly enough, whereas compounds having a vapor pressure greater than 10mm generally do not stay suitably entrapped by the cellulose over long periods of time.

Employing these criteria, compounds such as benzaldehyde, methyl salicylate, acetophenone and carvone are preferred species. Anisole, iso-amyl acetate, and eucalyptole are not preferred because at 60°C their vapor pressures exceed 10mm. Cinnamaldehyde, having a vapor pressure less than 1mm at 60°C, is not preferred because of its inadequate volatility.

Although menthol works to some extent in this invention, it is not a preferred species because the menthol is not retained as durably as would be desired.

Preferred compounds generally have carbonyl-containing groups such as aldehydes, ketones, esters, amides, and carboxyls. Another characteristic of preferred compounds is the presence of unsaturated carbon-carbon double bonds. Compounds possessing either the preferred carbonyl groups or double bonds appear to have good affinity for cellulose when applied in the manner of the present invention. Non-polar compounds such as saturated hydrocarbons do not appear to be readily entrapped by the cellulose.

The primary mode of perception of the compounds useful in the present invention is via the olefactory senses as opposed to the tasting senses. It would therefore seem more appropriate to refer to the compounds as odorants rather than flavorants.

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The amount of ammonia to be applied should be at least sufficient to thoroughly saturate the cellulosic substrate. This is essential in order to achieve complete swelling of the cellulose.

The co-solvents are generally highly polar, easily volatilized species such as methanol or tetrahydrofuran. They must be soluble in liquid ammonia and preferably also miscible with water.

A solvent-extracted burley stem material containing about 35% cellulose was utilized in the practice of this invention employing an anhydrous solution of 3% benzaldehyde in liquid ammonia. After evaporation of the NH_3 and exposure of the material to ambient air for a period long enough so that no odor of benzaldehyde was detectable, the treated material was found to contain 1.8% benzaldehyde. Twenty parts by weight of this material in shred form were blended with 80 parts of regular blended shredded tobacco. Cigarettes made from this mixture were found to deliver a very slight amount of benzaldehyde barely detectable to the smoker because of admixture with the other components of cigarette smoke.

In this connection, it should be emphasized that when the treated substrate is employed as a tipping paper, the flavor that is released in response to moisture from the smoker's lips is in close proximity to the smoker's nostrils and enters the nostrils undiluted by the other components of the smoke. In this manner, trace quantities of odorant achieve a significant effect in modifying the overall subjective perception of the smoke.

NBR:jl

cc: K. S. Burns
J. D. Hind

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